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Translation

PATENT COOPERATION TREATY

PCT/FR2003/050127

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference B 14186.3 EE	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/FR2003/050127	International filing date (*day/month/year*) 20 novembre 2003 (20.11.2003)	Priority date (*day/month/year*) 21 novembre 2002 (21.11.2002)
International Patent Classification (IPC) or national classification and IPC G01N 33/543, C08G 61/12		
Applicant COMMISSARIAT A L'ENERGIE ATOMIQUE		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
01 juin 2004 (01.06.2004)	02 March 2005 (02.03.2005)
Name and mailing address of the IPEA/EP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/FR2003/050127

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed

☒ the description:

pages 1-34, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

☒ the claims:

pages _____, as originally filed

pages _____, as amended (together with any statement under Article 19

pages _____, filed with the demand

pages 1-9, filed with the letter of 24 November 2004 (24.11.2004)

☒ the drawings:

pages 1/8-8/8, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

☐ the sequence listing part of the description:

pages _____, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/FR 03/50127

I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

1. The new set of claims submitted with the letter of 24 November 2004 fails to meet the requirements of PCT Article 34(2)(b).

1.1 Claim 1 has been amended to specify the manner in which the electropolymerisation step is performed. However, although the applicant states that this amendment would be supported by the application as originally filed, no basis was found for the expressions "with a charge less than 50 $\mu C/mm^2$" and "for a synthesis duration less than 1000 ms".

1.2 Consequently, the new set of claims cannot be accepted. The present report is therefore based on the application as originally filed.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	5-7	YES
	Claims	1-4, 8-10	NO
Inventive step (IS)	Claims		YES
	Claims	1-10	NO
Industrial applicability (IA)	Claims	1-10	YES
	Claims		NO

2. Citations and explanations

2.1 The present application claims a method for binding a protein on a pyrrole-based polymer and the use thereof for manufacturing sensors.

2.2 For the purposes of drawing up the present written opinion, the following documents were taken into account:

D1: LIVACHE T ET AL: "Polypyrrole DNA chip on a silicon device: Example of hepatitis C virus typing" ANALYTICAL BIOCHEMISTRY, vol. 255, 1998, pages 188-194;

D2: LIVACHE T ET AL: "Electroconducting polymers for the construction of DNA or peptide arrays on silicon chips." BIOSENSORS & BIOELECTRONICS, vol. 13, no. 6, 15 September 1998, pages 629-634;

D3: WO 00/36145 A (COMMISSARIAT ENERGIE ATOMIQUE; CAILLAT PATRICE (FR); ROSILIO CHARL) 22 June 2000.

2.3 Documents D1 and D2 describe the same method as the present invention;

- coupling the molecule to be immobilised with

pyrrole;

- mixing with a solution of pyrrole monomer;
- collectively electropolymerising on a conductive medium.

2.4 Electropolymerisation is carried out by supplying an amount of current to a microelectrode during polymerisation, with the aim of optimising the polypyrrole film thickness deposited on the surface (cf. D1, page 192). Synthesis of the film is stopped when the current applied reaches 125, 160, 200, 250 and 375 nC, values which correspond respectively - for electrodes measuring 50 µm x 50 µm - to 50, 64, 80, 100 and 150 µC/mm² and to a thickness of 10, 13, 16, 20 and 30 nm. Optimum film thickness is considered to be 20 nm (100 µC/mm²).

2.5 The same reasoning applies to D2, which studies the construction of "DNA or peptide arrays" on microelectrodes. It is clear from figure 4 that a series of tests was carried out with polymer films of different thickness (from 2 to 80 nm approximately), which were obtained by applying an amount of current from 10 to 400 µC/mm².

2.6 It follows that the subject matter of claims 1 to 4 and 8 to 10 does not appear to be novel and the present application fails to meet the requirements of PCT Article 33(2).

3. The subject matter of claims 5 to 7, relating to specific coupling, functionalisation and activation procedures of the pyrrole, does not appear to involve an inventive step as defined by PCT Article

33(3), since said techniques are routine steps (see for example D3, pages 7 to 13) that could only be considered inventive in combination with a novel and inventive binding process.

3.1 Consequently, the present application fails to meet the requirement of PCT Article 33(3), since the subject matter of claims 1 to 10 does not involve and inventive step (PCT Rule 65(1)(2)).